CLAIMS

What is claimed is:

1. A method of increasing an adherence force between two or more surfaces, the method comprising:

i.) providing a first surface comprising a plurality of nanofibers attached thereto;

ii.) providing at least a second surface; and,

iii.) contacting the first surface and the at least second surface, whereby the adherence force between the first surface and the second surface is increased in comparison to an adherence force between such surfaces in the absence of the plurality of nanofibers.

2. The method of claim 1, wherein one or more of the first surface, the at least second surface, and the plurality of nanofibers, comprise a material independently selected from the group consisting of: silicon, glass, quartz, plastic, metal, polymers, TiO, ZnO, ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, MgS, MgSe, MgTe, CaS, CaSe, CaTe, SrS, SrSe, SrTe, BaS, BaSe, BaTe, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, PbS, PbSe, PbTe, AlS, AlP, AlSb, SiO_1, SiO_2, silicon carbide, silicon nitride, polyacrylonitrile (PAN), polyetherketone, polyimide, an aromatic polymer, and an aliphatic polymer.

3. The method of claim 1, wherein the nanofibers consist essentially of a non-biological material.

4. The method of claim 1, wherein contacting the first surface and the at least second surface creates a van der Waals attraction between the surfaces, which van der Waals attraction is greater than a van der Waals attraction between the first surface and the at least second surface in the absence of the plurality of nanofibers.

5. The method of claim 4, wherein the attraction comprises from at least about 0.1 newton per centimeter^2 to at least about 100 newtons per centimeter^2.

6. The method of claim 4, wherein the attraction comprises from at least about 1 newton per centimeter^2 to at least about 25 newtons per centimeter^2.

7. The method of claim 4, wherein the attraction comprises from at least about 2 newtons per centimeter^2 to at least about 10 newtons per centimeter^2

8. The method of claim 1, wherein contacting the first surface and the at least second surface creates a friction force between the surfaces, which friction force is greater than a friction force between the first surface and the at least second surface in the absence of the plurality of nanofibers.

9. The method of claim 1, wherein the first surface comprises a surface density of members of the plurality of nanofibers, which surface density comprises from at least about 1 nanofiber per micron^2 to 1000 or more nanofibers per micron^2.

10. The method of claim 1, wherein the first surface comprises a surface density of members of the plurality of nanofibers, which surface density comprises from at least about 10 nanofibers per micron^2 to 250 or more nanofibers per micron^2.

11. The method of claim 1, wherein the first surface comprises a surface density of members of the plurality of nanofibers, which surface density comprises from at least about 50 nanofibers per micron^2 to 100 or more nanofibers per micron^2.

12. The method of claim 1, wherein the first surface and the at least second surface comprise a same material.

13. The method of claim 1, wherein the nanofibers comprise hollow nanotubular structures.

14. The method of claim 1, wherein substantially all nanofibers comprise one or more associated moiety.

15. The method of claim 14, wherein substantially all nanofibers comprise a coating of the one or more associated moiety.

16. The method of claim 14, wherein the one or more moiety comprises a functional moiety.

17. The method of claim 16, wherein the functional moiety increases a van der Waals attraction between the nanofiber and the at least second surface, which increased attraction is greater than a van der Waals attraction between the nanofiber and the at least second surface in the absence of the moiety.

18. The method of claim 16, wherein the functional moiety increases a friction force between the nanofiber and the at least second surface, which increased friction force is greater than a friction force between the nanofiber and the at least second surface in the absence of the moiety.

19. The method of claim 16, wherein the functional moiety creates a covalent bond between the nanofiber and the at least second surface.

20. The method of claim 1, wherein the at least second surface comprises a plurality of nanofibers attached thereto.

21. The method of claim 1, wherein the first surface comprises a surface of one or more medical device, and wherein the at least second surface comprises one or more biological tissue.

22. The method of claim 21, wherein the biological tissue comprises one or more of: a vessel, an organ, bone, flesh or plant material.

23. The method of claim 21, wherein the biological tissue comprises an animal tissue, an amphibian tissue, a reptilian tissue, an avian tissue, a mammal tissue, a non-human primate tissue, or a human tissue.

24. The method of claim 21, wherein the medical device comprises a clamp, a stent, a shunt, a probe, a retractor, a patch, a bandage, or a medical mesh.

25. The method of claim 24, wherein the plurality of nanofibers is disposed on a surface of the medical device, which surface physically contacts the one or more biological tissue.

26. A method of joining two or more articles, the method comprising:

i) providing a first article having at least a first surface, wherein the first surface comprises a plurality of nanofibers attached thereto,

ii) providing at least a second article having at least a first surface;

iii) mating the first surface of the second article with the plurality of nanofibers on the first surface of the first article, whereby the nanofibers contact the first surface of the second article at a plurality of contact points, such that forces between the nanofibers and the first surface of the second article adhere the first article to the second article.

27. The method of claim 26, wherein the nanofibers consist essentially of a non-biological material.

28. The method of claim 26, wherein the forces between the nanofibers and the first surface of the second article comprise one or more of van der Waals forces and friction forces.

29. The method of claim 26, wherein the plurality of contact points comprises a density of contact points per unit area of the second surface.

30. The method of claim 29, wherein the density of contact points comprises from at least about 1 contact point per micron^2 to 2000 or more contact points per micron^2.

31. The method of claim 29, wherein the density of contact points comprises from at least about 10 contact points per micron^2 to 500 or more contact points per micron^2.

32. The method of claim 29, wherein the density of contact points comprises from at least about 50 contact points per micron^2 to 250 or more contact points per micron^2.

33. The method of claim 29, wherein the density of contact points comprises from at least about 75 contact points per micron^2 to 150 or more contact points per micron^2.

34. The method of claim 26, wherein the plurality of contact points comprises a percent contact area of the second surface.

35. The method of claim 34, wherein the percent contact area comprises from about 0.1% to at least about 50% or more.

36. The method of claim 34, wherein the percent contact area comprises from about 0.5% to at least about 40% or more.

37. The method of claim 34, wherein the percent contact area comprises from about 1% to at least about 30% or more.

38. The method of claim 34, wherein the percent contact area comprises from about 2% to at least about 20%.

39. The method of claim 34, wherein the percent contact area comprises from about 5% to at least about 10% or more.

40. The method of claim 26, wherein the plurality of contact points comprises a density of contact points per unit area of the second surface and wherein the plurality of contact points comprises a percent contact area of the second surface.

41. The method of claim 40, wherein the density of contact points comprises from at least about 1 contact points per micron^2 to about 2000 or more contact points per micron^2, from at least about 5 contact points per micron^2 to about 1000 or more contact points per micron^2, from at least about 10 contact points per micron^2 to about 500 or more contact points per micron^2, from at least about 50 contact points per micron^2 to about 250 or more contact points per micron^2, or from at least about 75 contact points per micron^2 to about 150 or more contact points per micron^2; and, the plurality of contact points comprises a percent contact area of the second surface from about 0.1% to at least about 50% or more, from about 0.5% to at least about 40% or more, from about 1% to at least about 30% or more, from about 2% to at least about 20% or more, or from about 5% to at least about 10% or more.

42. A method of joining two or more articles, the method comprising:

i) providing a first article having at least a first surface;

ii) providing at least a second article having at least a first surface; and,

iii) providing a layer of nanofibers disposed between the first surface of the first article and the first surface of the at least second article, whereby the nanofibers contact the first surface of the first article at a plurality of contact points and the first surface of the at least second article at a plurality of contact points, such that forces between the nanofibers and the first surface of the first article and the first surface of the at least second article adhere the articles together.

43. The method of claim 42, wherein the nanofibers consist essentially of a non-biological material.

44. The method of claim 42, wherein the forces between the nanofibers and the first surface of the second article and between the nanofibers and the first surface of the first article, comprise one or more of van der Waals forces and friction forces.

45. The method of claim 26 or 42, wherein the first article comprises a surface of one or more medical device, and wherein the at least second surface comprises one or more biological tissue. .

46. The method of claim 45, wherein the biological tissue comprises one or more of: a vessel, an organ, bone, flesh, or plant material.

47. The method of claim 45, wherein the biological tissue comprises an animal tissue, an amphibian tissue, a reptilian tissue, an avian tissue, a mammal tissue, a non-human primate tissue, or a human tissue.

48. The method of claim 45, wherein the medical device comprises a clamp, a stent, a shunt, a probe, a retractor, a patch, a bandage, or a medical mesh.

49. The method of claim 48, wherein the plurality of nanofibers is disposed on a surface of the medical device, which surface physically contacts the one or more biological tissue.

50. An adherent device, the device comprising:

i) a first article having at least a first surface;

ii) at least a second article having at least a first surface; and,

iii) a layer of nanofibers disposed between the first surface of the first article and the first surface of the at least second article, whereby the nanofibers contact the first surface of the first article at a plurality of contact points and the first surface of the at least second article at a plurality of contact points, such that forces between the nanofibers and the first surface of the first article and the first surface of the at least second article adhere the articles together, and such that the forces between the articles are greater than a force between the articles in the absence of the nanofibers.

51. The method of claim 50, wherein the nanofibers consist essentially of a non-biological material.

52. The device of claim 50, wherein one or more of the first article and the at least second article comprises the layer of nanofibers.

53. The device of claim 50, wherein physical contact between the first and at least second substrate produces a van der Waals attraction between the surfaces.

54. The device of claim 50, wherein physical contact between the first and/or second surface and the nanofibers creates adherence between the surfaces through creation of friction forces between the surfaces.

55. The device of claim 53, wherein the attraction comprises from at least about 0.1 newton per centimeter^2 to at least about 100 newtons per centimeter^2.

56. The device of claim 53, wherein the attraction comprises from at least about 0.5 newton per centimeter^2 to at least about 50 newtons per centimeter^2.

57. The device of claim 53, wherein the attraction comprises from at least about 1 newton per centimeter^2 to at least about 25 newtons per centimeter^2.

58. The device of claim 53, wherein the attraction comprises from at least about 2 newtons per centimeter^2 to at least about 10 newtons per centimeter^2.

59. The device of claim 50, wherein the nanofibers comprise hollow nanotubular structures.

60. The device of claim 50, wherein substantially all nanofibers comprise one or more associated moiety.

61. The device of claim 50, wherein the one or more moiety comprises a functional moiety.

62. The device of claim 61, wherein the functional moiety creates a van der Waals attraction between the nanofiber and one or more of the first surface or the at least second surface, greater than a van der Waals attraction between the nanofiber and such surface in the absence of the moiety.

63. The method of claim 61, wherein the functional moiety creates a friction force between the nanofiber and one or more of the first surface or the at least second surface greater than a friction force between the nanofiber and such surface in the absence of the moiety.

64. The method of claim 50, wherein the second article comprises one or more of: a metal, a plastic, a ceramic, a polymer, silicon, quartz, glass, wood, plant tissue, animal tissue, bone tissue, stone, ice, or a composite.

65. The device of claim 50, wherein the device comprises a device for grasping the at least second article.

66. The device of claim 65, wherein the at least second article comprises biological tissue and wherein grasping comprises controllably adhering such tissue to the first article.

67. The device of claim 65, wherein grasping comprises a controllable period of time.

68. The device of claim 50, wherein the device comprises a device for controllably positioning two or more biological tissues.

69. The device of claim 68, wherein the device positions the two or more tissues relative to one another.

70. The device of claim 50, wherein the first article comprises a screw.

71. The device of claim 50, wherein the first article comprises a nail.

72. The device of claim 50, wherein the first article comprises a staple.

73. The device of claim 50, wherein the first article comprises a probe.

74. The device of claim 50, wherein the first article comprises a laminar sheet.

75. The device of claim 50, wherein the second article comprises at least a second surface and wherein the device further comprises at least a third article having at least a first surface; and a second layer of nanofibers disposed between the second surface of the second article and the first surface of the at least third article, whereby the nanofibers contact the second surface of the second article at a plurality of contact points and the first surface of the at least third article at a plurality of contact points, such that forces between the nanofibers and the second surface of the second article and the first surface of the third article adhere the articles together, and such that the adherent forces between the articles are greater than an adherent force between the articles in the absence of the nanofibers.

76. The device of claim 75, wherein the first and the third articles together comprise a medical device.

77. The medical device of claim 76, wherein the first and the third articles together comprise a clamp, a binding staple, a forceps, a vise grip, a circular clamp, a barrel clamp, or a clip.